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30TH ANNIVERSARY OF THE LABORATORY OF ELECTROMAGNETISM, MOSCOW UNIVERSITY

N. V. Baklin

April 1949 marked the 30th anniversary of the Laboratory of Electromagnetism of the Physics Faculty, Moscow University, and the 61st anniversary of its founder and director, Prof V. K. Arkad'yev, Corresponding Member, Academy of Sciences USSR.

Arkad'yev started his scientific work in 1907 under the guidance of Prof P. N. Lebedev.

In 1913, on the basis of his research on (1) the properties of magnetic substances in changing fields of superhigh-frequency waves and (2) on the magnetic permeability of iron and nickel, and on the basis of subsequent studies, Arkad'yev published his "Theory of the Electromagnetic Field in Ferromagnetic Metals."

Arkad'yev's theory of magnetic resonance was the forerunner of the present theory of nuclear magnetic resonance, and his theory of magnetization resulted in additions to Maxwell's equations.

Under Arkad'yev's direction, the laboratory has published about 300 works which have brought it international recognition.

The laboratory worked out a theory of dynamic magnetization, differing from magnetization in a constant field due to the inertia of unit carriers of magnetism inside atomic nuclei and eddy currents in the crystalline particles of metal, as well as in other respects.

The laboratory formulated a theory of magnetic spectroscopy which first stated and solved the problem of magnetic spectra determining the dependence

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of the magnetic properties of matter upon the frequency of the field. This study throws light on various problems: (1) the number of oscillations per second in unit magnets in substances, (2) their mutual interaction, (3) the causes retarding their motion and, (4) the structure of ferromagnetic substances.

Application of this theory to problems of electrical and radio engineering is of great practical value -- for example, in selecting steel for transformers.

The laboratory also developed various methods for determining the effective conductivity of electrotechnical steel and for computing the resistance of iron and steel conductors.

Prof A. A. Glagoleva-Arkad'yeva, an associate of the laboratory, during her studies of the "white blotch" in the electromagnetic wave scale, spanned the interval between very short radio waves and infrared rays. She constructed a "mass emitter" with the help of which she obtained microwaves from 50 to 82 microns long, thus solving the problem of the single nature of radio and light waves.

Her mass-emitter theory revealed the emission mechanism of a new source of radiant energy. She also established a unit scale, and suitable classification and terminology for electromagnetic waves.

The laboratory succeeded in "fixing" very short radio waves by a quasi-photographic method and developed a method of photography by centimeter waves on sensitive electrochemical paper.

Training scientific personnel is another important function of the laboratory. Many famous names of professors and scientists, such as Academicians N. S. Akulov and B. A. Vvedenskiy, are on its roster.

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